

Work Order ID 79116

January-20-12 10:29:58 AM

\*79116\*

**U/R**

Page 1

Item ID: D212-664-107

Accept

\*N900040100\*

Setup Start

\*NS1\*

Revision ID:

*N/A*

Stop

\*NS2\*

Item Name: Crosstube Low Standard Fwd

Start Date: 20/01/2012 Start Qty: 1.00

\*1\*

Cust Item ID:

Required Date: 07/02/2012 Req'd Qty: 1.00

\*1\*

Customer:

Reference:

Approvals:

Process Plan: *M.C.J*

Date: *12/01/20* Tooling:

Date:

Run Start

\*NR1\*

QC:

Date:

SPC (Y/N):

Date:

Stop

\*NR2\*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr

Revision Nbr

D212-664-147

Rev B (DEO)

100

0.00

\*100\*

DOCUMENT CONTROL *SL*

DC

Memo

0.00

Document Control

Photocopy bluefile and create labels as per PPP D212-664-107  
D6019-128 (ID = 2.125") = CHG 002  
D6005-128 (ID = 2.000") = CHG 003

*SL 02/03/10*  
*@HGX03*

*MLJ 12/02/29*

110

0.00

\*110\*

Packaging

Packaging

Memo

0.00

Packaging

*MO/RM 12/2/9*

120

0.00

\*120\*

BENDING MACHINE - CROSSTUBES

CNC Bend 2

Memo

0.00

CNC Alpha 160 Bender

Bend tube as per Dwg D212-664-107 using CNC bender program 212-107

*MO/RM 12/2/9*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

# Work Order ID 79116

**\*79116\***

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January-20-12 10:29:58 AM

Item ID: D212-664-107 Accept **\*N900040100\*** Setup Start **\*NS1\***  
 Revision ID: U/R Stop **\*NS2\***  
 Item Name: Crosstube Low Standard Fwd  
 Start Date: 20/01/2012 Start Qty: 1.00 **\*1\*** Cust Item ID:  
 Required Date: 07/02/2012 Req'd Qty: 1.00 **\*1\*** Customer:  
 Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start **\*NR1\***  
 QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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130 QC15- Crosstube Dimensional Check 0.00

**\*130\***

QC

Quality Control

Memo

140

**\*140\***

Crosstubes

Crosstubes

Crosstubes

Memo

1-Cut tube as per inspection dwg and deburr ends. \*\*\*ensure saw is square\*\*\*

2-Position cuffs on tube ensure proper positioning

3-Drill tube as per dwg using DT8577 location #7 & # 212 ULF using jig DT8548 and DT8549 as per QSI 10

4-Transfer drill rivet holes from cuff into tube.

5-Identify cuff position and Batch # on each and identify tube as per dwg D212-664-107.

6- Inspect surface damage

7- Deburr and realodine cuff.

8/2/09

0.00

0.00

JW  
MO

12-2-10

12/2/10

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

**Part No:** \_\_\_\_\_ **PAR #:** \_\_\_\_\_ **Fault Category:** \_\_\_\_\_ **NCR:** Yes No **DQA:** \_\_\_\_\_ **Date:** \_\_\_\_\_  
**Resolution:** \_\_\_\_\_ **Disposition:** \_\_\_\_\_ **QA: N/C Closed:** \_\_\_\_\_ **Date:** \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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**NOTE:** Date & initial all entries

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**Accept**

Setup Start \*NS1\*

Stop \*NS2\*

**Start Date:** 20/01/2012    **Start Qty:** 1.00    **\*1\***

**Cust Item ID:**

**Required Date:** 07/02/2012      **Req'd Qty:** 1.00      **\* 1 \***

**Customer:**

**Reference:**

**Approvals:**      **Process Plan:**                      **Date:**                      **Tooling:**                      **Date:**

Run Start \*NR1\*

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop \*NR2\*

### Operation Description

### Set Up/ Run Hours

Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
---------	--------	-----------	------------	------------	---------------	-------------

150

### Crosstubes Chemical Conversion

0.00

**\*150\***

## Memo

HandFXtube

## Hand Finishing Crosstubes

160

### QC3- Inspect Part Finish

0.00

**\*160\***

## Memo

QC

## Quality Control

170

QC5- Inspect part completeness to step on W/O

0.00

**\*170\***

## Memo

QC

## Quality Control

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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**NOTE:** Date & initial all entries

**\*79116\***

January-20-12 10:29:58 AM

**\*N900040100\***

Setup Start \*NS1\*

Stop **\*NS2\***

**\* 1 \***

**\* 1 \***

**Reference:**

Run Start \*NR1\*

Stop **\*NR2\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Accept Qty	Reject Qty	Reject Number	Insp. Stamp

0.00

**\*180\***

0.00

Liquid Penetrant Inspection as per QSI 038Or  
Issue P/O: 16223 LPI as per ASTM 1417  
Level 2 Attach copy of NDT results to work order

0.00

**\*190\***

0.00

Ensure copy of NDT results attached to work order.

0.00

**\*200\***

0.00

## Quality Control

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Item ID: D212-664-107 Accept **\*N900040100\*** Setup Start **\*NS1\***  
 Revision ID: U/R Stop **\*NS2\***  
 Item Name: Crosstube Low Standard Fwd  
 Start Date: 20/01/2012 Start Qty: 1.00 **\*1\*** Cust Item ID:  
 Required Date: 07/02/2012 Req'd Qty: 1.00 **\*1\*** Customer:  
 Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start **\*NR1\***  
 QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210	Crosstubes	0.00							
<b>*210*</b>									
Crosstubes	Memo	0.00							
Crosstubes	1-Rivet Cuffs as per Dwg D212-664-147. with Sika flex in Between tube & Cuff A/R SIKAFLEX -241/-291 BATCH: <u>119999</u>								
215	QC5- Inspect part completeness to step on W/O	0.00							
<b>*215*</b>									
QC	Memo	0.00							
Quality Control									

AS 12 - 2 - 23  
EW 12 02 23 (1)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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**NOTE:** Date & initial all entries

**Work Order ID 79116****\*79116\***

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Item ID: D212-664-107

Accept

**\*N900040100\***Setup Start **\*NS1\***

Revision ID: U/R

Item Name: Crosstube Low Standard Fwd

Stop **\*NS2\***

Start Date: 20/01/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 07/02/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
220	SprayPaint	0.00							
<b>*220*</b>									
SprayPaint	Memo	0.00							
Spray Painting	1-Prime inside and outside crosstube as per QSI 005 4.2								
	2-Paint outside crosstube with White Imron as per QSI 005 4.2								
	PRIME:								
	Start Time: <u>10:15</u>								
	Finish Time: <u>11:00</u>								
	PAINT:								
	Start Time: <u>3:30</u>								
	Finish Time: <u>4:15</u>								
230	QC14- Inspect Spray Paint	0.00							
<b>*230*</b>									
QC	Memo	0.00							
Quality Control	Wrap in plastic bag to protect from scratches								

AS 12-2-23M 12-2-24 (1)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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## Quality Control

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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**NOTE:** Date & initial all entries

**Work Order ID 79116****\*79116\***

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Item ID: D212-664-107

Accept

**\*N900040100\***Setup Start **\*NS1\***

Revision ID: U/R

Item Name: Crosstube Low Standard Fwd

Stop **\*NS2\***

Start Date: 20/01/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 07/02/2012 Req'd Qty: 1.00

**\*1\***

Customer:

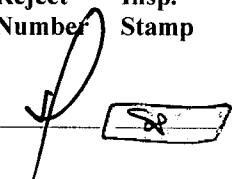
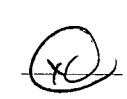
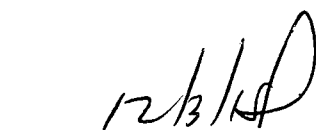
Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
255	Pick Kit	0.00							
<b>*255*</b>									
Packaging	Memo	0.00					12/3/11		
Packaging									
260	QC4- 100% Inspect kits for completeness	0.00							
<b>*260*</b>									
QC	Memo	0.00							
Quality Control									
270		0.00							
<b>*270*</b>									
Packaging	Packaging	0.00							
Packaging	Memo	0.00							
Packaging	Identify and pack for shipping as per PPP D212-664-107								

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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**Work Order ID 79116****\*79116\***

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Item ID: D212-664-107

Accept

**\*N900040100\***Setup Start **\*NS1\***

Revision ID: U/R

Item Name: Crosstube Low Standard Fwd

Stop **\*NS2\***

Start Date: 20/01/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 07/02/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
280	QC21- Final Inspection - Work Order Release	0.00							
<b>*280*</b>									
QC	Memo	0.00							
Quality Control									

MLJ 12/03/01

ME 12-03-01

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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# - Picklist Print

January-20-12 10:30:02 AM

Page 1

Work Order ID: 79116

\*79116\*

Parent Item: D212-664-107

\*D212-664-107\*

Parent Item Name: Crosstube Low Standard Fwd

Start Date: 20/01/2012

Required Date: 07/02/2012

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A New Issue 07.09.12 EC verified by: JLM  
 IPP Rev:B ECN 1100 08-01-11 DD verified by: EC  
 IPP Rev:C Ecn 1121 08-02-25 DD Verified by:ec IPP Rev:D  
 10.05.27 added pick kit DD verf:EC IPP Rev:E 11.10.17  
 added SEQ 215 DD verf:EC IPP REV:F 11.11.03 as per  
 chg003 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D212-664-107TRN		Manufactured	No			140	Each	4.0000	1	1			

\*D212-664-107TRN\*

Crosstube Turning Detail

Location	Loc Qty	Loc Code
LG	4	
76248	1	
76249	1	
77227	1	
77228	1	

D3659-1 Manufactured No

220 Each 6.0000 2

\*D3659-1\*

CUFF

Location	Loc Qty	Loc Code
ST482	6	
67005	1	
75173	5	

CR3212-4-06 Purchased No

240 Each 374.0000 44

\*CR3212-4-06\*

CHERRY RIVET

Location	Loc Qty	Loc Code
ST331	374	
112492	18	
112794	8	
119717	248	
120187	100	

\*\*

\*\*

\*\*

MO 12/2/9

MO 12/2/9

12-2-23

44

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Work Order ID: 79116

**\*79116\***

Parent Item: D212-664-107

**\*D212-664-107\***

Parent Item Name: Crosstube Low Standard Fwd

Start Date: 20/01/2012

Required Date: 07/02/2012

Start Qty: 1.00

Required Qty: 1.00

D3595-063-450

Manufactured No

240

Each

34.1095

4

4

**\*D3595-063-450\***

RUBBER CUSHION

\*\*

AP 12-2-24

Location

Loc Qty

Loc Code

MAT052 77678

34.109474

4

67353

2

68893

6

70113

0.56

71354

0.2

74113

0.349474

75597

25

MS21920-25

Purchased No

240

Each

36.0000

4

4

**\*MS21920-25\***

Clamp(per MIL-DTL-8783C)

\*\*

AP 12-2-24

Location

Loc Qty

Loc Code

LG050

36

116264

2

117998

4

118142

4

119339

2

119746

2

120054

22

D2893-1

Manufactured No

240

Each

5.0000

2

2

**\*D2893-1\***

2.75 Support

\*\*

AP 12-2-24

Location

Loc Qty

Loc Code

LG

2

77606

2

LG052 78561

3

72865

2

76250

1

2

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Work Order ID: 79116

\*79116\*

Parent Item: D212-664-107

\*D212-664-107\*

Parent Item Name: Crosstube Low Standard Fwd

Start Date: 20/01/2012

Required Date: 07/02/2012

Start Qty: 1.00

Required Qty: 1.00

D3428-1

Manufactured No

260

Each

5.0000

1

\*D3428-1\*

Placard

\*\*

Location

Loc Qty

Loc Code

ST042

5

76508

5

Purchased

No

260

Each

88.0000

4

AN6-35A

\*AN6-35A\*

BOLT

\*\*

Location

Loc Qty

Loc Code

ST342

88

120187

88

Purchased

No

260

Each

50.0000

4

AN6-36A

\*AN6-36A\*

Bolt

\*\*

Location

Loc Qty

Loc Code

ST342

50

118422

2

119449

1

120187

47

Purchased

No

260

Each

1,214.000

6

MS21042L6

\*MS21042L6\*

Nut

\*\*

Location

Loc Qty

Loc Code

ST300

1214

117677

25

118384

3

118927

48

119075

938

120308

200

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Picklist Print

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Work Order ID: 79116

\*79116\*

Parent Item: D212-664-107

\*D212-664-107\*

Parent Item Name: Crosstube Low Standard Fwd

Start Date: 20/01/2012

Required Date: 07/02/2012

Start Qty: 1.00

Required Qty: 1.00

AN960JD616

NAS1149D0663J

Purchased

No

260

Each

0.0000

18

18

\*AN960JD616\*

Washer

\*\*

11/9/07 12/3/11

SP

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

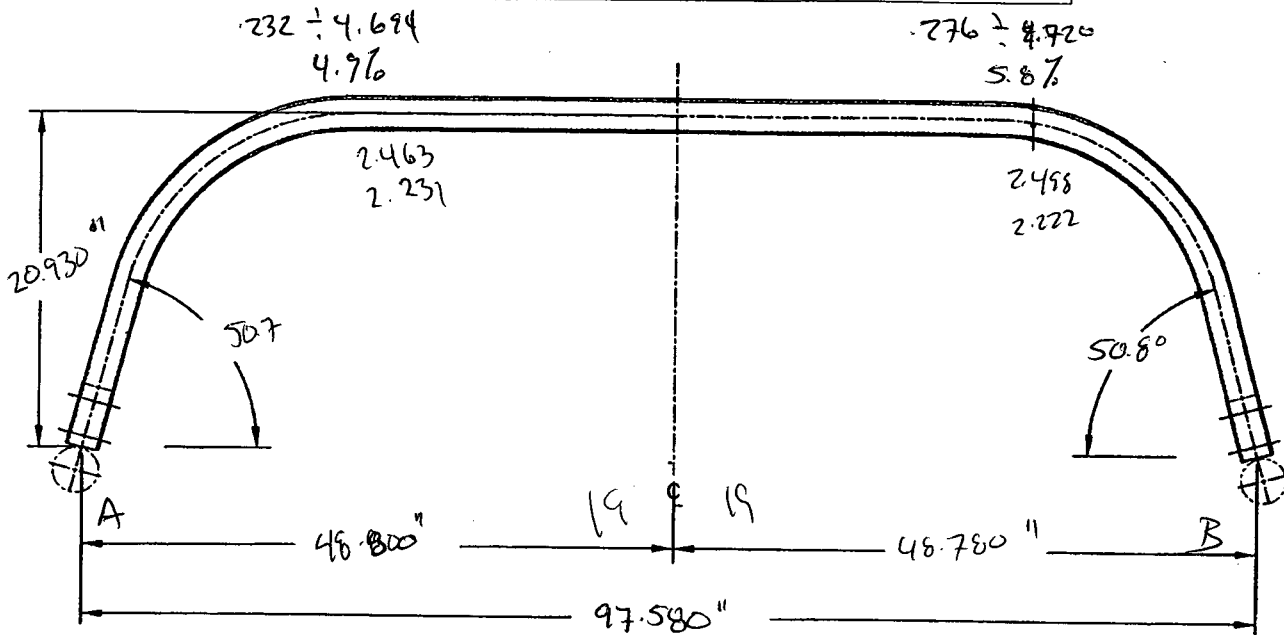
Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

<b>DART AEROSPACE LTD</b>		<b>Work Order:</b>	79116
<b>Description:</b> Crosstube Low Fwd (205/212/412)		<b>Part Number:</b>	D212-664-107
<b>Inspection Dwg:</b> D212-664-147 <b>Rev:</b> B		<b>Page 1 of 1</b>	

Required Dimension	Min	Max
Height	20.79	21.05
1/2 Span	48.55	48.81
Angle	49	52
Total Span	97.1	97.62



Comments	
Size A =	4.97% crushin @ 19 Passes
Size B =	5.87% crushin @ 15 Passes

QC15 Inspection	S
Date	17/02/05

Rev	Date	Change	Revised by	Approved
A	08.02.29	New Issue	KJ/JM	
B	10.01.21	Dwg Rev updated	KJ	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

Item	Qty -147	Qty -147B	Part Number	Description
1	X		D212-664-147	CROSSTUBE ASSEMBLY (205/212/412 LOW FWD)
2		X	D212-664-147B	CROSSTUBE ASSEMBLY (214 LOW FWD)
3	1	1	D6019-128	CROSSTUBE
4	2	2	D2893-1	SUPPORT
5	4	4	D3595-063-450	RUBBER CUSHION
6	2	2	D3659-1	CUFF
7	4	4	MS21920-25	CLAMP (OR MS21920-26)
8	44	44	CR3212-4-06	RIVET (OR M7885/3-4-06)
9	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
10	A/R	A/R	SIKAFLEX-241/-291	SEALANT (OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT)

# **GENERAL NOTES:**

- 1) MATERIAL: MANUFACTURED FROM D6019-128  
FINISHED LENGTH = 126.528±0.020 (BEFORE BENDING/TRIMMING)
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF  
USING VIBRATING STYLUS.
- 7) WEIGHT: D212-664-147 = 24.2 lbs (PER IIN-D212-664)  
D212-664-147B = 24.2 lbs (PER IIN-D212-664)
- 8) PART IS SYMMETRIC ABOUT CENTERLINE
- 9) WHEN MACHINING TAPER, RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD  
BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6%  
BASED ON O.D., EXCEPT UP TO 10% IS ALLOWED IN AREA NOTED.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2893-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF  
D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER  
INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-063-450 RUBBER CUSHIONS TO SECURE THE D2893-1  
SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE  
SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS.  
DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE  
UNACCEPTABLE.
- 15) TORQUE CLAMPS 60 TO 100 IN.-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS  
NOT BOTTOMED-OUT AFTER TORQUING.
- 16) INSTALL D3659-1 CUFF AFTER CHEMICAL CONVERSION COAT BUT BEFORE PAINT, WITH A LAYER OF  
SIKAFLEX-241/-291 OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT BETWEEN CUFF AND CROSSTUBE.  
SEAL EDGE OF CUFF TO ENSURE NO GAPS.
- 17) TOUCH-UP HOLES WITH CHEMICAL CONVERSION COAT.

SHOP COPY  
REF ID:  
ENCLOSING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 79.116 M.C.J.  
12/01/20

DEO ATTACHED

Per ECW#1164  
11.07.20  
UNDER REVIEW  
11/13/13

RELEASED  
2009-10-29  
WV

B	REVISE GENERAL NOTES/PART LIST: UPDATE TO CURRENT STANDARDS: ADD -147B (ZN C4-2, D4-2)	RF	09.09.30
A	NEW ISSUE	CP	07.07.07
REV.	DESCRIPTION	BY	DATE
DESIGN	<u>RF</u>	<b>DART AEROSPACE LTD</b>	
DRAWN	<u>RF</u>	HAWKESBURY, ONTARIO, CANADA	
CHECKED	<u>RF</u>	DRAWING NO.	REV. B
MFG. APPR.	<u>RF</u>	D212-664-147	SHEET 1 OF 4
APPROVED	<u>RF</u>	TITLE	SCALE
DE APPR.	<u>RF</u>	CROSSTUBE (205/212/412 LOW FWD)	NTS
DATE	09.09.30	COPYRIGHT © 2007 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

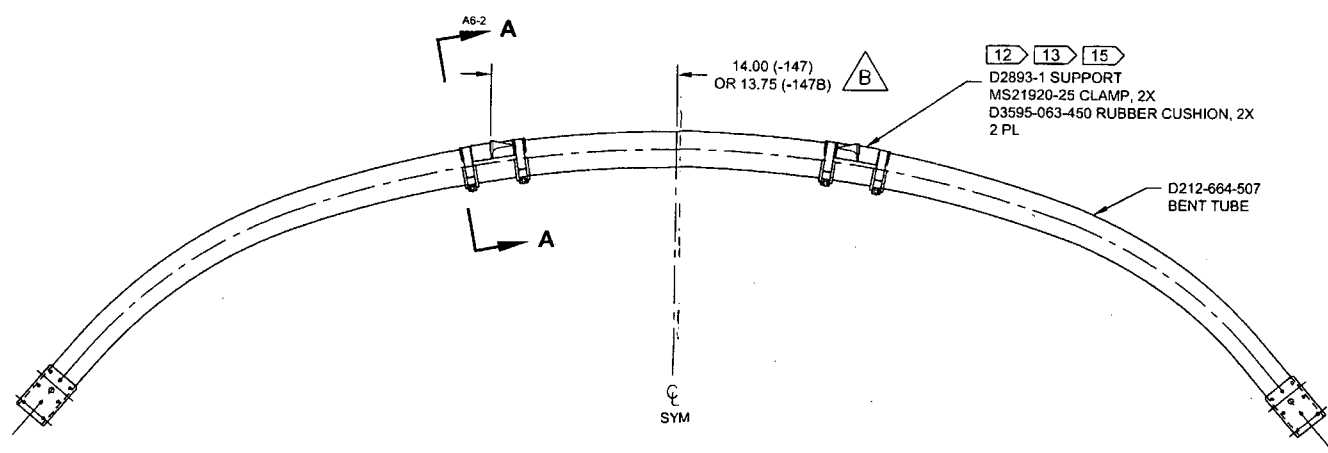
Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

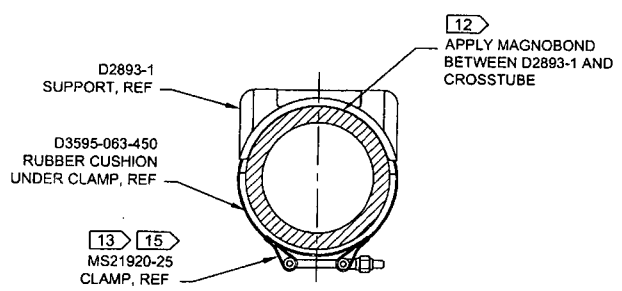
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

79116



**D212-664-147/-147B**  
**ASSEMBLY DETAIL**



**SECTION A-A** D5-2  
SCALE 4X

DEO ATTACHED

ECW #11-014  
K.07.28  
UNDER REVIEW  
CP 11.06.13

**RELEASED**  
2009-10-29

DESIGN	97	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF		
CHECKED	97	DRAWING NO.	REV. B
MFG. APPR.	18	D212-664-147	SHEET 2 OF 4
APPROVED	18	TITLE	SCALE
DE APPR.	18	CROSSTUBE (205/212/412 LOW FWD)	NTS
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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



A horizontal scale bar with tick marks and numbers 1 through 8, decreasing from right to left.



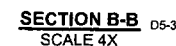
10 B

UCN #11-614

5K.07.20

~~UNDER REVIEW~~

CP 11.04.13



RELEASED  
2009-10-29



DATE 09.09.30

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**Dart Aerospace Ltd**

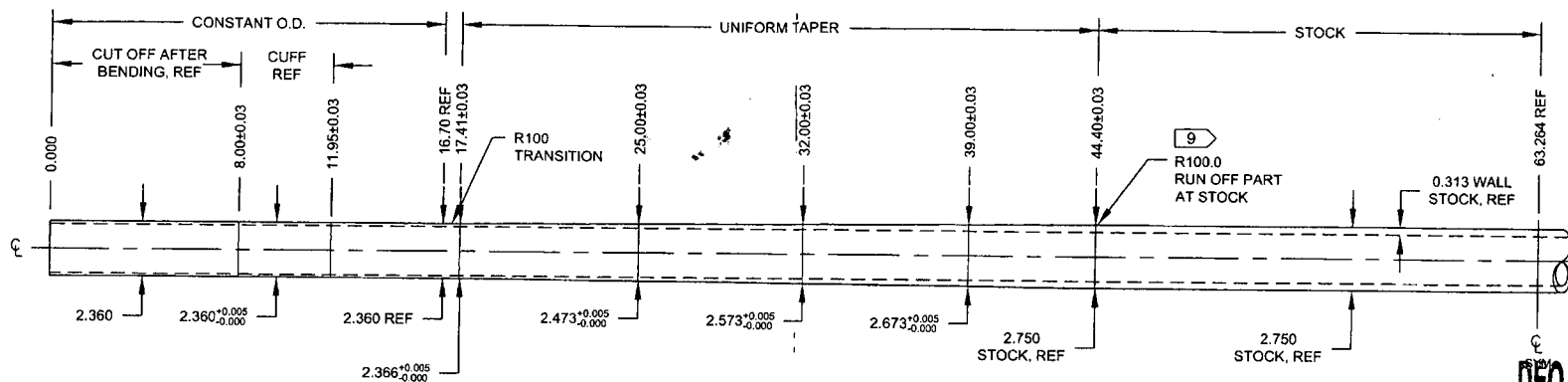
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_  
 Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

79116



**D212-664-147TRN**  
**TURNING DETAIL**

**DEO ATTACHED**

ECO #1-614  
11.07.26  
**UNDER REVIEW**  
11/06/27

**RELEASED**  
2009-10-29

DESIGN	90	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF		
CHECKED	90	DRAWING NO.	REV. B
MFG. APPR.	90	D212-664-147	SHEET 4 OF 4
APPROVED	90	TITLE	SCALE
DE APPR.	90	CROSSTUBE (205/212/412 LOW FWD)	NTS
DATE	09.09.30	COPYRIGHT © 2007 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

79116

DRAWING NO. D212-664-147	TITLE CROSSTUBE ASS'Y (205 LOW FWD)	REV. B	<b>DART AEROSPACE LTD ENGINEERING ORDER</b>		D.E.O. NO. D212-664-147-B-1	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN 92	CHECKED ASS	MFG. APPR. 18	APPROVED W.P.		DE APPR. H		
DATE 11.07.15	DATE 11.07.20	DATE 11.07.21	DATE 11/07/21		DATE 11.07.21		

**PURPOSE:**

REPLACE MAGNOBOND WITH PROSEAL.

**CHANGE:**

IS:

Item	Qty -147	Qty -147B	Part Number	Description
9	A/R	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

WAS:

9	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
---	-----	-----	----------------	---

NOTE 12 & 15, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

- 12) TO INSTALL D2893-1 SUPPORT: ABRABE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.**

WAS:

- 12) INSTALL D2893-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

**RELEASED**  
2011-07-28  
W.P.

W/O:		WORK-ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

## 5.2 STANDARD GEAR CROSSTUBES

Item	-107	-207	-209	Part Number	Description
	X			D212-664-107	CROSSTUBE INSTALLATION, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD FWD
		X		D212-664-207	CROSSTUBE INSTALLATION, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD AFT
			X	D412-664-209	CROSSTUBE INSTALLATION, 412 STANDARD AFT
6	1			D212-664-147	CROSSTUBE ASSEMBLY, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD FWD
7		1		D212-664-247	CROSSTUBE ASSEMBLY, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K STANDARD AFT
8			1	D412-664-249	CROSSTUBE ASSEMBLY, 412 STANDARD AFT
10	2			* D2893-1	SUPPORT
11	4			* D3595-063-450	RUBBER CUSHION
12	4			* MS21920-25	CLAMP (OR MS21042-26)
13	4			AN6-35A	BOLT
14	4			AN6-36A	BOLT
15	6			MS21042L6	NUT (OR MS21042-6)
16	18			AN960JD616	WASHER
20		2		* D2940-1	SUPPORT
21		4		* D3595-063-530	RUBBER CUSHION
22		4		* MS21920-28	CLAMP (OR MS21042-30)
23		4		AN6-40A	BOLT
24		2		AN6-41A	BOLT
25		6		MS21042L6	NUT (OR MS21042-6)
26		18		AN960JD616	WASHER
30			1	* D2896-1	SUPPORT
32			2	* D3595-063-570	RUBBER CUSHION
33			4	* MS21920-28	CLAMP
34			2	* MS21920-30	CLAMP (OR MS21042-32)
35			4	AN6-40A	BOLT
36			2	AN6-41A	BOLT
37			6	MS21042L6	NUT (OR MS21042-6)
38			18	AN960JD616	WASHER
39			2	* D3189-1	CHAFING SHIELD
45	2			* D3659-1	CUFF
46		2	2	* D3660-1	CUFF
47	44	44		* CR3212-4-06	RIVET (M7885/3-4-06)
48			44	* CR3212-4-07	RIVET (M7885/3-4-07)
50	1	1		D3428-1	PLACARD

\*REFERENCE ONLY. PARTS ARE INCLUDED IN D212-664-147/-247 OR D412-664-249 ASSEMBLIES ABOVE  
 NOTE: KITS INCLUDE EXTRA HARDWARE FOR COMPATIBILITY WITH BOTH DART AND BELL/AAI  
 SKIDTUBES.

Part Number D212-664-107  
Description CROSSBER LOW FWD (204/205/212)

Part Number D212-664-107

Description CROSS TUBE LOW FWD (204/205/212)

H:\forms\engineer\approved forms\CHGREC revA





## RAPPORT D'INSPECTION PAR RESSUAGE

P- 12178

PAGE 1 DE 1

CLIENT: DART AEROSPACE DATE: 2012-02-17 HEURE: ☒ AM ☐ PM  
ATTENTION: CHANTEL N° TRAVAIL: 188-12-C0043  
ADRESSE: 1270 ABERDEEN ST. N° CLIENT PO/WO: 30551  
HAWKES BURY, ONTARIO SITE DE TRAVAIL: HAWKES BURY  
PROJET: \_\_\_\_\_ ACCEPTATION STD.: ASTM E1417-05 DATE/RÉV.: NO INDICATION  
ITEM(S) EXAMINÉ: SEE BELOW

DESCRIPTION DES TRAVAUX: \_\_\_\_\_ N° PROCÉDURE: PT0002 DATE/RÉV.: 2009 N° TECHNIQUE: LT-XXXLXX DATE/RÉV.: 2009  
N° ITEMS: SEE BELOW MATÉRIEL: ALUMINIUM ÉPAISSEUR: VARIABLE  
DESCRIPTION: FPT ON X-TUBES AND RAPPEL

## DÉTAILS DES INSPECTIONS

MÉTHODE: ☒ FLUORESCENT ☐ VISIBLE ☐ LAVABLE À L'EAU ☐ MÉTHODE DISSOLVANT ☐ PRÉ-ÉMULSIONNANT  
MARQUE: MAGNAFLUX LUM. NOIRE S/N: 26529 PUISS. > 1 000 µ W/cm² ☒ AMBIANT < 2 fc  
PÉNÉTRANT: ZL67 TEMPS PÉNÉTRATION MIN. 10 30 MIN. ÉQUIP. LUMIÈRE ☒ LAMP. POCHÉ ☐ LAMP. CULASSE ☒ PUISS. > 100 fc @ SURFACE  
DISSOLVANT PÉNÉTRANT: \_\_\_\_\_ TEMPS SÉCHAGE MIN. > 10 MIN. AUTRES: \_\_\_\_\_  
RÉVÉLATEUR: \_\_\_\_\_ TEMPS RÉVÉLATION MIN. 10 MIN. MÈTRE LUM. N/S DATE CAL DUE: 2012-12-07  
TYPE RÉVÉLATEUR: ☐ NON AQUEUX ☐ AQUEUX ☐ SEC

## SURFACE INSPECTÉE

CONDITION SURFACE: ☐ MEULÉE ☐ SOUDÉE ☒ MACHINÉE ☐ MRENAILLÉE ☐ MÉTAL PROPRE  
TEMPÉRATURE SURFACE: ☐ < - 4°C/20°F ☐ - 4°C/20°F A 10° C/50°F ☒ 10°C/50°F A 52°C/125°F ☐ > 52°C/125°F

RÉSULTATS (☐ MÉTRIQUE ☐ IMPÉRIALE)

ITEM	COMMENTAIRES	ACCEPTÉ	REJETÉ
1	ID 79701 item D 3011-1 (x3)	✓	
2	ID 80049 item D 206-667-2078L	✓	
3	ID 78574 item D 412-664-203	✓	
4	ID 78573 item D 412-664-203	✓	
5	ID 78575 item D 412-664-203	✓	
6	ID 78576 item D 412-664-203	✓	
7	ID 79115 item D 212-664-107	✓	
8	ID 79116 item D 212-664-107	✓	

NOTE: NO INDICATION FOUND, AT THE MOMENT OF INSPECTION ON ALL PIECES.

## Étendue des Services

L'entente selon laquelle le Groupe Acuren Inc. exécute les services ne concerne que les énoncés par écrit. En aucune circonstance ces services ne s'étendent au-delà de l'exécution des services demandés. Il est entendu que toutes les descriptions, les observations et les expressions d'opinions faites par Acuren reflètent les opinions ou les observations de l'entreprise fondées sur l'information et les hypothèses fournies par le propriétaire/opérateur, et elles ne constituent pas des déclarations ou des garanties ou ne peuvent être interprétées comme constituant. Le Groupe Acuren Inc. n'assume aucune des responsabilités du propriétaire/opérateur, et le propriétaire/opérateur conserve la responsabilité entière des décisions prises en matière d'ingénierie, de fabrication, de réparation et d'usage à partir de l'information ou des données fournies par Acuren en rapport avec les services décrits dans les présentes ne peuvent excéder le coût des services rendus.

## Norme de Diligence

Dans l'exécution des services, le Groupe Acuren Inc. applique le degré de diligence, le soin et la compétence normalement exercés dans des circonstances semblables par d'autres fournisseurs de ce type de services opérant dans la même localité ou dans une localité similaire. Aucune autre garantie, implicite ou explicite, n'est faite ou voulue par le Groupe Acuren Inc.

## SIGNATURES

REPRÉSENTANT: Andrew Sheldon FTJ#: F003487  
TECHNICIEN (SIGNATURE): [Signature] MOULÉ: DAVID REPIN RAPPORT  
NOM (MOULÉ): DAVID REPIN RÉVISÉ PAR: \_\_\_\_\_  
1<sup>er</sup> TECHNICIEN 2<sup>ème</sup> TECHNICIEN  
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